

# Turn-key Near-Infrared Photon-Counting Detector Module for LIDAR Applications, Phase I

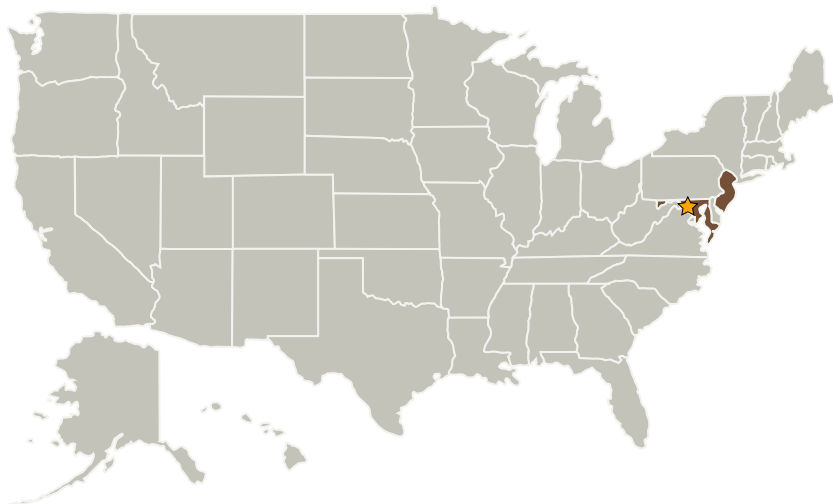
Completed Technology Project (2004 - 2004)



## Project Introduction

We propose to design and deliver a turn-key photon counting detector module for near-infrared wavelengths, based on large-area InGaAs/InP avalanche photodiodes (APDs) that have been optimized for photon counting. The detector module will incorporate all of the essential photon-counting detector system elements: thermoelectric cooling, high-speed bias gating and avalanche quenching circuits, power supply, control and signal interfaces, optical fiber input, and a large-area APD. Previous near-infrared photon-counting systems have been severely limited by the use of commercially-available telecommunications-grade APDs, designed for linear operation at room temperature and low internal gain. These APDs are far from optimum for single photon counting at reduced temperature and very high internal gain. Work by our company has demonstrated that both quantum efficiency and pulse jitter can be greatly improved using APDs developed specifically for photon counting. During Phase I we will develop and deliver a prototype photon counting detector module optimized for low jitter and high single-photon quantum efficiency at wavelengths between 1.0 and 1.6 microns. During Phase II we will deliver a more advanced detector module having interchangeable APDs individually optimized for photon counting in the 1.0, 1.5, and 1.9 micron wavelength bands.

## Primary U.S. Work Locations and Key Partners



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## Table of Contents

Project Introduction	1
Primary U.S. Work Locations and Key Partners	1
Organizational Responsibility	1
Project Management	2
Technology Areas	2

## Organizational Responsibility

### Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

### Lead Center / Facility:

Goddard Space Flight Center (GSFC)

### Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Goddard Space Flight Center(GSFC)	Lead Organization	NASA Center	Greenbelt, Maryland
Sensors Unlimited, Inc.	Supporting Organization	Industry	Princeton, New Jersey

## Primary U.S. Work Locations

Maryland	New Jersey
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## Project Management

**Program Director:**

Jason L Kessler

**Program Manager:**

Carlos Torrez

**Principal Investigator:**

Keith Forsyth

## Technology Areas

**Primary:**

- TX14 Thermal Management Systems
  - └ TX14.2 Thermal Control Components and Systems
    - └ TX14.2.2 Heat Transport